

## SOME SCIENTIFIC RESULTS OF AN EXCURSION TO THE HEX RIVER MOUNTAINS.

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The expedition of the Mountain Club to the Hex River Mountains on October 2, 1893, was a distinct success. It was such, not only on account of the considerable number of mountaineers who took part in it and scaled the highest peak of the range, but also on account of the interesting results and observations obtained by the naturalists of the party.

The Hex River Mountains, rising boldly with their precipitous walls more than 5,000 feet above the valley of the Breede River, like gigantic gate-keepers, overlook the two principal passages from the south-western coast regions to the elevated tablelands of the interior.

The northern route leads through Mitchell's Pass, the old Mostert's Kloof, the southern through the valleys of the Hex River and Verkeerde Vley, whence the old colonists and many an explorer reached the vast plains of the Karroo by passing through a narrow defile, which was accordingly named Karroo Poort. Their tales of adventure, of oxen stolen by the Hottentots or eaten by lions, of wheels broken and waggons capsized, came vividly to my mind as I gazed from the summit far away to the east and north, and I fancied that I could almost see the little homestead described in Burchell's book, where he rested and replenished his boxes of provisions, before setting out on his two years' journey beyond the Gariep.

One would naturally think that mountains occupying such a prominent position ought to be well known and explored; but such is not the case, for until recently even the height of the mountain was underrated by more than 1,000 feet.

In all books of South African geography, the Winterhoek, near Tulbagh, which is 6,840 feet high, is stated to be the highest peak in the Western Province, and the Hex River range is generally given as 6,000 feet high.

During an ascent of the highest peak of the range made a year ago by a party of gentlemen from Worcester, Mr. Isaac Meiring took readings of a pocket aneroid, and calculated the height to be 7,400 English

feet, *i.e.*, 560 feet higher than the Winterhoek. This result was so surprising that I did not consider it to be very probable.

It was during the preparations for the excursion of the Mountain Club that Mr. Meiring went to Triangle Station, and meeting Mr. Greef, a surveyor from Worcester, there, asked him to take the angle of elevation of the Hex River pile from the platform of the station. Four observations gave the angle as  $4^{\circ} 29'$ ;  $4^{\circ} 23'$ ;  $4^{\circ} 27'$ ;  $4^{\circ} 23'$ ; the second and fourth figure being obtained after reversing the theodolite.

The mean angle consequently is  $4^{\circ} 25' 30''$ . As the altitude of Triangle Station is known exactly by railway levelling, it was only necessary to find the horizontal distance of the station from the Hex River pile.

This could not be computed from the map in the Surveyor-General's office, for Triangle Station had not been included in the official survey of the country, as I learnt from Mr. J. Bosman, one of the surveyors who carried out this part of the work on account of the Government about twelve years ago. Mr. Bosman kindly promised to look through his journal, and fortunately found the entry of two horizontal angles, just enough to enable him to fix Triangle Station on the map.

From the co-ordinates of his observations he computes the total horizontal distance as 53,920 English feet; hence the height of the pile above the level of Triangle Station is

$$53,920 \times \text{tang. } 4^{\circ} 25' 30'', \text{ or } 4,172 \text{ feet.}$$

The correction for refraction and curvature of the surface of the earth amounts to 60 feet, and the altitude of Triangle Station, as ascertained by railway levelling, is 3,193 feet; hence the total height of Matroosberg is 7,425 feet.

Although it was almost certain that this result must be very near the truth, I wished to verify it on my ascent of the mountain. For this purpose I took with me a pocket aneroid and a hypsometer with a Centigrade thermometer, which would have enabled me to read off  $\frac{1}{20}$  of a degree, corresponding to a difference in altitude of 60 feet.

I had made arrangements that there should be simultaneous readings of the barometers and thermometers of the meteorological stations at Worcester, Ceres, and Matjesfontein, and I had also left a barometer, kindly lent by the Meteorological Commission, at Hex River East station. During the day previous to the ascent I compared the aneroid with the mercurial barometer, and read all the instruments again on the morning of the excursion, while a friend of mine kindly undertook to read the instruments at the station during the day. When I reached the summit of the mountain it was nearly one o'clock, and the party waiting there was anxious to descend as soon as possible.

First of all, I tried to light the lamp of the hypsometer, but, although I constructed a sheltering wall of stones and snow around it, I did not succeed, for the wind was so strong that the flame was extinguished as soon as I lit it; hence I had to confine myself to the reading of the aneroid and the thermometer.

I calculated the results by comparing the readings on the mountain with those of the barometer at Hex River East; and making all corrections for the effect of the temperature on the mercury, the aneroid and the atmosphere, I obtained a difference of altitude of 5,694 feet. As the altitude of Hex River East station, as determined by railway levelling, is 1,566 feet, the height of the mountain above sea-level would be 7,260 feet.

When I had completed these calculations, I received the observations from Ceres. Taking them as a basis, and comparing them with the reading of my pocket aneroid on the top of the mountain, I find the height of Matroosberg to be 5,899 feet above the village, which gives a total height of 7,392 feet above sea-level. This, you will see, is only 33 feet less than that obtained by trigonometrical measurements.

The difference of 132 feet between the results from observations at Hex River East and Ceres—places situated on opposite sides of the mountain, at nearly the same altitude (1,566 and 1,493 feet respectively)—must be a warning to all who use an aneroid not to trust too much to single readings, as only a series of observations could eliminate such errors.

As the results obtained by theodolite and aneroid approach each other so closely that they are practically identical, they must be very near the truth, and I think there can be no question that the Matroosberg, Hex River pile, is at least 400 feet higher than the Winterhoek.\*

In winter the higher parts of the mountain are covered with snow, generally from May to November, or even to January, as has been observed by many a traveller who admired the grand scenery of the Hex River Pass from the windows of a railway carriage.

Seen from this distance, however, one cannot realize what enormous quantities of snow really exist on these mountains. Even now, in October, after the sun has melted most of it, it still covers wide fields, and it covers them so completely that all irregularities of the surface disappear, and that some summits still bear a smooth and spotless white cap. The snow has neither the dusty appearance of fresh flakes, nor the compact character of the *firn* of the Alps, but is granular, like snow on which the sun has acted for some days, without giving it time to freeze again during the nights.

\* About a month after this meeting, Mr. Meiring has settled the question definitely by trigonometrical observations from three different points. The mean of the three observations is 7,434 feet above sea-level. See *Mountain Club Annual*, 1894.



As even on this cloudy day the temperature of the air was 15° Fahr. above the freezing-point, the melting of the snow is very rapid, and yet we found it over ten feet deep in some places. That the insolation of an African sun is particularly strong was shown by many a stone which stood isolated in the midst of the snow-fields. Mr. Meiring informs me that even in January he found it in sheltered spots three feet deep, and it would be interesting to know when the last snow really disappears.

Not numerous but interesting are the discoveries in natural history, especially in entomology and botany.

Mr. Lightfoot reports on his finds as follows :

‘The beetles were fairly numerous both as regards specimens and species, some forty kinds being caught during the two days.

‘Several common round Cape Town were caught, including *Cicindela lurida*, *Onitis appelles*, *Julodis fascicularis*, *Lycus rostratus*, *Mylabris Capensis*, *Ceroplesis Æthiops*.

‘Three species, *Peritrichia guttata*, a species of *Lepetrix*, and *Zonitis morio*, have also been taken in Little Namaqualand. The latter was here taken only on *Lebeckia cytisoides*, a South-western plant.

‘A species of *Hoplocnemis*, *Monochelus*, and a *Julodis* (the two latter new to science), are, as far as is known at present, only found in this district.’

On the mountain itself I found only two beetles, one specimen of *Hipporhinus deplorobundus*, Fähr., not recorded since its discovery, fifty years ago by Wahlberg, and one, *Trichostetha*, which I unfortunately lost.

So much greater was my surprise when I reached the snow-fields near the summit and noticed numerous small black insects on them. I at once sat down on the snow and began collecting some, but the little things jumped away and buried themselves in the snow with great alacrity ; so, in order to capture them, I had to take the lumps of snow in which they were hidden. Fortunately, I had a small tin box with me, which I filled hurriedly in this way, thinking that the insects were all alike.

If my friends had not been so eager to descend, I would have collected many more and searched on different fields. As it was, however, I had to hasten on with my observations and then rush down. I did not have a chance of examining these insects until I returned to town, when I saw that they were little flies, and I also noticed some difference between them. On microscopic inspection, I found that I had two kinds of bugs and nine different species of flies, belonging to widely-separated tribes.\* If so many species are among

\* A friend of mine who has examined them reports : ‘Among these Diptera are new species of *Sciara*, *Phora*, *Sepsis*, and other genera.’

twenty-four specimens only, it is highly probable that a good many more must have been present on these snow-fields, and that, although some of these may have been brought thither by the wind, there exists an insect fauna of its own in these alpine regions of the Cape. None of these flies is nearly related to the glacier flea (*Desoria glacialis*) which abounds on and near the red snow of the Alps, but they are not the only flies that live on snow, for in Macquart's 'Histoire Naturelle,' Vol. I., p. 74, I find the description of a fly of similar size, *Chionea araneoides*, which was discovered by Mr. Dalman on the snow-fields in Northern Sweden :

'La Chionée est plus extraordinaire encore par son habitation ; elle ne s'est encore trouvée que sur la neige, et elle y marche avec facilité. Lorsque Dalman la découvrit dans les forêts de la Suède, son étonnement ne fut sans doute pas moins grand que celui du botaniste qui trouva pour la première fois "*l'Uredo nivalis*." C'est pendant tout l'hiver et particulièrement sur la neige nouvellement tombée que l'on rencontre la Chionée.'

Who would have thought that South Africa could be the home of insects, similar in their mode of life to this curiosity of the Swedish forests. 'Ex Africa semper aliquid novi.'

The flora of the Hex River Valley was just at its best. Flowers of all kinds abounded ; delicate annuals, bulbous plants, and shrubs covered with blossoms filled the air with fragrant scent.

Several rare plants were found by Mr. Bolus. Among others he rediscovered *Celidium spinosum*, Benth., only collected by Drège fifty years ago in the same locality, and *Melolobium exsudans*, Harv., known only from the collection of Dr. Thom.

Remarkable for their beauty and deserving of cultivation, Mr. Bolus mentions the magnificent *Mesembryanthemum Haworthii*, perhaps the finest in the genus, with flowers over three inches in diameter, and the very handsome *Malvastrum divaricatum*.

While the valley and the lower slopes were studded with flowers, the higher regions, where I searched, were gradually only awakening from their winter sleep. Of my finds, as far as they are worked out, one is new. It is a heath, but differs in some points so greatly from all the other 400 species of *Erica*, that some botanists would not hesitate to make a new section of it. The peculiarities are the corolla and the style. The latter is not straight and glabrous as usual, but recurved and pubescent, and the corolla is collapsible ; that means to say, it is oval as a bud, but on opening, its upper half collapses into the lower one, thus forming a cup with double walls. Consequently the stamens protrude far beyond the corolla. Another heath which I found near the summit is also not yet described, but it is not new to

me, as I discovered it some years ago on the Great Winterhoek.\* There evidently exists a flora peculiar to the higher regions of our mountains, and although I brought home only two more plants which I had found before on the Winterhoek, *viz.*, a new species of *Euchætis*, not yet described, and *Protea rupicola*, R. Br., which is recorded only from Mund's collections on that mountain, I have no doubt that later in the season many more such plants will appear on the Matroosberg. At present the summit is still covered with snow, and the higher slopes are soaked with icy water; those regions have still winter.

Soon, however, spring will awaken the plants that are sleeping in the cold ground, and the immediately following summer will bring forth their blossoms, as it does on the alpine meadows, where the lovely *Soldanella* closely follows the retiring snow-fields, in its impatience often piercing the snowy cover with its tiny blue bells.

When the slopes of Table Mountain are parched and dry and dead, the vegetation of these regions will be in its bloom, and many rare or new plants may be found; among which I expect to see the highly interesting *Nanolirion Capense*, Benth., one of Mr. Bolus's famous discoveries. Highly interesting, I say, not because it is in any way conspicuous, but because it is the only representative of the genus, and that genus has its nearest ally, also a genus with one species only, in Australia. Since Mr. Bolus discovered it in 1879, on the little Winterhoek, it was found by me near the summit of the Great Winterhoek (near Tulbagh), and these are the only two localities recorded.

There are other features in this vegetation of the higher regions that remind me very much of the alpine flora; however, I shall be able to characterize it better after I have seen it in the proper season.

Another point of interest is the remarkable difference in the flora of the two sides of the valley.

The Hex River Mountains are a part of the barrier which separates two of our best-defined vegetable regions, *viz.*, the South-western coastlands and the Karroo. The valley of the Hex River itself still belongs to the former, and its lower slopes do not yet show much difference from similar situations along the Breede River, but the higher parts differ considerably. The first day I ascended the slopes eastward of the railway, to a height of 1500 feet above the Hex River East station; the next day took me up the western side. The difference in the vegetation was most striking, the latter quite similar in its character to that of the mountains of our neighbourhood: Proteaceæ (7), Heaths (12), Orchids (9), Restiaceæ, Diosmeæ, and other isolated

\* Both species have been described since by Mr. H. Bolus, the former as *Erica Marlothii*, the latter as *E. nubigena*, in *Journal of Botany*, August, 1894.



South-western types. On the Eastern side only two Proteaceæ (1 *Protea* and 1 *Leucadendron*) and a few Restiaceæ, but not a single heath or orchid. In their place abounded species of *Crassula*, *Cotyledon*, *Aloe*, and *Mesembryanthemum*, together with many other plants with fleshy or leathery leaves, such as we know to be characteristic of the Karroo. Although some South-western plants had also advanced to these higher slopes, the general character of the vegetation on the two sides of the valley shows a difference greater than (*e.g.*) that between the North and South of Germany, and it is highly interesting to learn from Mr. Lightfoot that two species of beetles, known to him from Namaqualand did occur only east of the railway line, but not on the west. To a certain extent the difference can be accounted for by the distribution of sun and shade, the North-western slopes being considerably cooler than the Eastern, but I am not aware of another instance where two floral regions so widely different in their elements approach each other so closely, and yet do not mix, without the barrier of a mountain or ocean between them.